

2/27/17

"Mistakes are the portal of Discovery." - James Joyce

HW: Finish the Related Rates handout

AIM: What are Related Rates?

Warm Up:

What does  $\frac{dy}{dx}$  mean?

"Derivative of  $y$  with respect to  $x$ ".

Name \_\_\_\_\_

Date \_\_\_\_\_

## Introduction to Related Rates

1. Given
- $y = 4x^3 - 3x^2 - 9x + 1$
- , find
- $\frac{dy}{dx}$

$$\frac{dy}{dx} = 12x^2 - 6x - 9$$

2. Given
- $y = 4w^3 - 3w^2 - 9w + 1$
- , find
- $\frac{dy}{dw}$

$$\frac{dy}{dw} = 12w^2 - 6w - 9$$

3. Given
- $v = 4m^3 - 3m^2 - 9m + 1$
- , find
- $\frac{dv}{dm}$

$$\frac{dv}{dm} = 12m^2 - 6m - 9$$

4. Given
- $y = 4x^3 - 3x^2 - 9x + 1$
- , find
- $\frac{dy}{dt}$

$$\frac{dy}{dt} = 12x^2 \frac{dx}{dt} - 6x \frac{dx}{dt} - 9 \frac{dx}{dt}$$

5. Given
- $p = 2L + 2W$
- , find
- $\frac{dp}{dt}$

$$\frac{dp}{dt} = 2 \frac{dL}{dt} + 2 \frac{dW}{dt}$$

6. Given
- $A = \pi r^2$
- , find
- $\frac{dA}{dt}$

$$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$$

7. Given
- $V = \frac{4}{3}\pi r^3$
- , find
- $\frac{dV}{dt}$

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$$

8. Given
- $V = \pi r^2 h$
- , find
- $\frac{dV}{dt}$

$$\frac{dV}{dt} = 2\pi r \frac{dr}{dt} h + \pi r^2 \frac{dh}{dt}$$

9. Given
- $V = \frac{1}{3}\pi r^2 h$
- , find
- $\frac{dV}{dt}$

$$\frac{dV}{dt} = \frac{2}{3}\pi r \frac{dr}{dt} h + \frac{1}{3}\pi r^2 \frac{dh}{dt}$$

10. Given
- $c^2 = a^2 + b^2$
- , find
- $\frac{dc}{dt}$

$$2c \frac{dc}{dt} = 2a \frac{da}{dt} + 2b \frac{db}{dt}$$

$$\frac{dc}{dt} = \frac{2a \frac{da}{dt} + 2b \frac{db}{dt}}{2c}$$